

1 WE CLAIM:

2 1. A method of collecting data for a geographic database that represents
3 roads in a geographic region, the method comprising:

4 with a vehicle that travels along the roads, using a barometer associated with the
5 vehicle to collect data indicating altitudes as the vehicle travels along the roads;
6 analyzing said altitude data;
7 based on said analyzing, deriving road grade data along said roads; and
8 storing data in said geographic database that represent road grade.

9

10 2. The method of Claim 1 wherein said road grade data indicates a location
11 of a road grade change point.

12

13 3. The method of Claim 1 wherein said road grade data indicates a direction
14 of the road grade.

15

16 4. The method of Claim 1 wherein said road grade data indicates a section of
17 constant road grade along the road.

18

19 5. The method of Claim 1 wherein said road grade data indicates a road
20 grade value.

21

22 6. The method of Claim 1 further comprising collecting data indicating
23 positions of the vehicle as the vehicle travels along the roads.

24

25 7. The method of Claim 1 further comprising:
26 identifying a change in altitude value between consecutively collected altitude
27 data exceeding a threshold amount.

1 8. The method of Claim 7 wherein said change in altitude corresponds to a
2 change in window position associated with the vehicle.

3

4 9. The method of Claim 7 wherein said change in altitude corresponds to a
5 change in operation of an air conditioning unit associated with the vehicle.

6

7 10. The method of Claim 1 further comprising:
8 filtering the altitude data to remove outlier data.

9

10 11. The method of Claim 1 wherein the vehicle is a probe data collection
11 vehicle that collects data while traveling in the geographic region for purposes other than
12 data collection.

13

14 12. A method of obtaining data for a geographic database using a vehicle
15 moving on roads in a geographic region comprising:

16 collecting data indicating atmospheric pressure and position of the vehicle as the
17 vehicle travels on roads in the geographic region;

18 analyzing the atmospheric pressure data and the position data to identify a section
19 of constant road grade along the road traveled by the vehicle; and

20 updating the geographic database to indicate the section of constant road grade.

21

22 13. The method of Claim 12 wherein the atmospheric pressure data is
23 obtained from a barometer associated with the vehicle.

24

25 14. The method of Claim 12 further comprising identifying a direction of the
26 road grade.

27

28 15. The method of Claim 12 further comprising identifying a road grade
29 change point.

30

1 16. The method of Claim 12 further comprising identifying a road grade value
2 for the section of constant road grade.

3

4 17. A system for collecting data for a geographic database that represents
5 roads in a geographic region comprising:

6 a data collection unit located in a vehicle that travel along the roads in the
7 geographic region;

8 a barometer associated with the vehicle, said barometer providing altitude data to
9 said data collection unit;

10 a positioning system associated with the vehicle, said positioning system
11 providing position data to said data collection unit; and

12 a data processing unit analyzing said altitude data and said position data, based on
13 said analyzing, inferring road grade data along said roads.

14

15 18. The system of Claim 17 wherein said data processing unit is located in a
16 data collection facility.

17

18 19. The system of Claim 17 wherein said data collection unit receives data
19 from a navigation system associated with the vehicle.

20